DIMENSIONS OF PSYCHOPATHOLOGY AND TRAIT AFFECT DO NOT PREDICT NOTICING OF AN UNEXPECTED NON-EMOTIONAL OBJECT

BY

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THESIS

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Abstract

Few studies have investigated individual differences in susceptibility to inattentional blindness, a phenomenon where people fail to notice fully visible but unexpected objects when they are engaged in an attention-demanding task. In the present study, we explored whether different dimensions of psychopathology (i.e., anxious arousal, worry, and depression), trait affect, and perceived control of cognition and emotion predicted noticing of an unexpected, non-emotional object. Results indicated that none of the measures included predicted noticing. Implications and suggestions for future research are discussed.

TABLE OF CONTENTS

INTRODUCTION

People often fail to notice fully visible but unexpected objects when they are engaged in an attention-demanding task. Across a wide range of tasks and situations, a surprisingly large percentage of people experience this “inattentional blindness.” It occurs for both simple (Mack & Rock, 1998) and complex (Simons & Chabris, 1999) unexpected objects, and generalizes from the laboratory to naturalistic (Haines, 1991) or real-world contexts (Chabris et al, 2012; Hyman et al, 2010). In most inattentional blindness studies, some people notice and others do not, raising a fundamental question: What factors affect noticing? Research addressing this question has adopted two approaches: (a) explore the task parameters that affect noticing rates, or (b) examine whether some individuals or groups of people are more likely than others to notice.

Many task and display-related factors influence the rate of noticing. For example, noticing rates are greater for unexpected objects falling near the focus of attention (Mack & Rock, 1998; Newby & Rock, 1998; Most et al, 2000) as well as for objects that look similar to the attended items in the display (Most et al, 2001; Simons & Chabris, 1999). In effect, when the unexpected object falls within the focus of attention, either spatially or featurally, people are more likely to notice it. Moreover, increasing the demands of the primary task reduces noticing rates (Simons & Chabris, 1999; Simons & Jensen, 2009; Bredemeier et al, 2012; Cartwright-Finch & Lavie, 2007). When people devote more effort to the primary task, they are less able to detect unexpected events.

Unlike task-related contributors to noticing, individual differences in noticing rates have been surprisingly understudied, perhaps because of the nature of the task itself. Inattentional blindness studies, by definition, focus on noticing of *unexpected* objects. Once participants know to look for the unexpected, the nature of the task itself has changed, making repeated testing for stable individual differences problematic. Rather than looking for reliable individual differences in noticing across trials, most individual difference studies have looked across participants for associations between noticing and other variables. Evidence for such differences has been mixed.

Most individual difference studies have focused on the link between cognitive abilities and noticing (e.g., working memory, perceptual speed). A few studies find that greater working memory capacity is associated with noticing (e.g., Richards et al., 2010), but others find no relation (e.g., Bredemeier & Simons, 2012). Individual differences in other cognitive functions (e.g., inhibition, shifting) are unrelated to noticing (Richards et al., 2010; Bredemeier & Simons, 2012). Similarly, individual differences in the ability to track moving objects effectively do not predict noticing (Simons & Jensen, 2009; Bredemeier & Simons, 2012). Together, the lack of a reliable relationship between cognitive abilities and noticing is consistent with a dissociation between the detection of expected and unexpected items. Individual differences in cognitive abilities predict noticing of attended and expected items as well as the ability to perform focused attention tasks, but they do not seem to predict noticing of unexpected items falling outside the focus of attention.

Although a growing number of studies have explored the links between cognitive abilities and noticing, relatively few studies have explored whether non-cognitive factors (e.g., personality, anxiety) predict inattentional blindness. Such personality factors might hold more promise as an explanation for individual differences in noticing (Simons & Jensen, 2009). For example, individual differences in both trait and state emotion affect attention to and processing of emotional information. Negative affect and depression bias attention toward and improve memory for negative information (Gotlib & Joormann, 2010; Crocker et al., 2012). Such individual biases might also influence the detection of unexpected negative information—in effect, negative information falls within the attention set of people with negative affect or depression, so an unexpected and emotionally negative stimulus might be more noticeable to them.

Individual differences in emotional processing could also influence processing of non-emotional information (e.g., Derakshan & Eysenck, 2009). For example, depression is associated with diminished ability to think or concentrate (APA, 2000), meaning that trait and state psychological distress could influence noticing by altering attention control processes. In some ways, depression induces impairments akin to multitasking, leading to decreased attention capture by an abruptly appearing unexpected item (Bredemeier et al. 2012; Boot, Brockmole, & Simons, 2005; Lavie & DeFockert, 2005).

Anxiety also might affect the detection of unexpected events by increasing responsiveness to potential threats (Heller, 1993; Nitschke, Heller, & Miller, 2001). Anxiety can be distinguished from anhedonic depression and further decomposed into worry and anxious arousal (Nitschke, Heller, & Miller, 2000; Engels et al., 2007; Engels et al., 2010). Each of these dimensions is associated with differences in cognition. Anxious arousal is associated with increased vigilance and enhanced attention to both sides of space as well as with increased activity in right posterior brain regions specialized for visual and spatial information processing

(Heller, Etienne, & Miller, 1995). In contrast, worry is associated with increased verbal rumination and accompanying left prefrontal activation (Engels et al., 2007; 2010; Heller, Nitschke, Etienne, & Miller, 1997). Consequently, anxious arousal in particular might predict better detection of unexpected objects.

The idea that anxious arousal might affect noticing is consistent with models in which anxiety modulates the balance between top-down and bottom-up attentional systems —anxiety increases the influence of stimulus-driven attention and decreases the influence of goal-directed attention (Eysenck et al., 2007; Derakshan & Eysenck, 2009). Given that people are less likely to notice unexpected objects falling outside the scope of their attention set (Most et al, 2005)—objects that are excluded from the focus of attention—a reduction in the contribution of goal-directed attention should increase the probability of noticing unexpected objects that fall outside the observer's attention set. For people higher in anxious arousal, an unexpected object still should affect stimulus-driven processing but should not be as inhibited by top-down attention sets.

Although neither worry nor anxious arousal affects attention capture by an expected, task-irrelevant stimulus (Bredemeier et al, 2012), the effect of these personality variables on noticing of unexpected objects remains unclear. In one study, people with high anxiety were more likely to detect an unexpected object, but only when it had a negative valence (i.e. frowning face) and appeared in a stress condition (Lee & Telch, 2008). No studies have explored the effects of anxiety on inattention for emotionally neutral stimuli.

Even if these dimensions of psychopathology do not predict noticing of unexpected objects, affective traits might. A growing literature links negative affect—a hallmark feature of depression and anxiety, although distinct from them theoretically and empirically (Crocker et al., 2012)—to impairments in cognitive control. For example, trait negative affect is associated with facilitated automatic orienting of attention (Wallace & Newman, 1997) and impaired controlled or self-regulated attention. A tendency to be fearful (trait fear) might engage a stronger cognitive and physiological threat response than would anxious arousal. If so, it might be more likely to modulate inattentional blindness.

In addition to affect traits (fear) and dimensions of psychopathology (anxious arousal, worry, and depression), other personality differences thought to influence attention include mindfulness, attention control, and affective control. People with dispositional mindfulness purportedly spread attention more broadly and are more attentive to the present. If so, they might devote less attention to the primary task (e.g., tracking objects) and more to the surrounding context. They might also have a default attention set to focus more on context. Either could increase the likelihood of detecting unexpected objects. Individual differences in attention control, or the ability to regulate attention and maintain vigilance when performing the primary task, might also affect noticing. Finally, affective control might influence noticing by increasing the likelihood that emotions will intrude on awareness, thereby affecting attention to the primary task.

To the extent that noticing of unexpected objects is reduced by top-down attention sets, anxious arousal might lead to greater detection of unexpected objects by virtue of the reduced influence of goal-directed attention. However, individual differences in goal-directed and stimulus-driven attention associated with anxiety might only influence the processing of *expected* stimuli. Other cognitive factors such as working memory capacity predict noticing of task-irrelevant, expected stimuli but do not reliably predict noticing of unexpected stimuli. By this view, anxiety might modulate performance of a primary, attention-demanding task (e.g., object tracking) even if it has no effect on detection of unexpected objects. This view is consistent with the idea that individual differences in cognitive ability do not predict the detection of unexpected objects (Simons & Jensen, 2009; Bredemeier & Simons, 2012).

In this study, we explored whether individual differences in psychopathology and trait affect influence predict noticing of an unexpected object. Specifically, we examined whether noticing was predicted by (a) dimensions of psychopathology (anhedonic depression, anxious arousal, and worry), (b) state and trait affect, and (c) measures of mindfulness, attention control, and affective control. By examining which (if any) of these variables predict noticing, we can better determine the reasons for individual differences in noticing.

METHODS

Participants

603 undergraduates at the University of Illinois at Urbana-Champaign participated in the study for course credit. Of those, 505 (30.9% male, Age range: 18-23 years, Mean age = 18.9, SD = 1.1) successfully completed all of the tasks and were included in analyses. All participants reported having normal or corrected-to-normal vision.

Materials

Inattentional blindness task

Participants completed a sustained inattentional blindness task based on Most et al. (2001). On each trial, four white and four black letters (Ls and Ts) moved independently at a fixed speed (4.32°/second) in a gray rectangular display window (640x480) centered on the screen. Participants were instructed to count the total number of times the four white shapes touched the sides of the window while ignoring touches by the black shapes. Each trial lasted approximately 8200ms, and participants then were prompted to type the number of touches they had counted.

On the fifth trial, after 3 seconds of object motion, a gray cross entered the display window on the right, passed linearly across the middle of the display at the same movement rate as the other items, and exited on the left. The gray cross was visible for 4.7 seconds, and after it disappeared, the other objects continued moving for 500 ms (see Figure 1).

On this “critical” trial, after entering the number of touches, participants were asked “Did you notice anything other than the Ls and Ts on that last trial?” A “no” response ended the experiment. Following a “yes” response, participants were asked to type a description of what they had seen. Those who reported that they did not notice anything unexpected were considered to have experienced inattentional blindness. Those who were able to report at least one feature of the unexpected object (shape, color, direction of motion) were considered to have noticed it.

For each trial, tracking accuracy was considered correct if counts were within 20% above or below the actual number of bounces (see Bredemeier & Simons, 2012 for more method details). Other cases were considered as incorrect. The percentage of the first four trials with correct counting was used as an index of primary task performance.

Personality Measures

Table 1 lists the self-report questionnaires used to measure individual differences in state and trait affect and attention and emotion control (in the order they were administered).

We used the Positive and Negative Affect Schedule-Expanded Form (PANAS-X; Watson & Clark, 1994) to measure trait negative affect (NA), trait positive affect (PA), and trait fear. In this measure, participants indicated the extent to which they experienced 13 negative emotions (e.g., afraid, nervous, irritable, upset) and 10 positive emotions (e.g., interested, excited, active, inspired) emotions during the previous few weeks on a scale from 1 (“very slightly or not at all”) to 5 (“extremely”). Out of 13 negative emotion items, ten of the negative emotion items were used as a measure of negative affect and six were used to measure trait fear (i.e., afraid, scared, frightened, nervous, jittery, shaky). Three items (i.e., afraid, scared, jittery) were used for both negative affect and fear. State fear, state negative affect (NA), and state positive affect (PA) were measured using the same items and scale but with a different instruction (i.e., "Indicate to what extent you feel this way right now"). This measure was administered immediately before participants performed the sustained attention task.

Procedures

Participants were tested in a computer lab accommodating groups of up to 24 people. All participants completed the trait and state PANAS first, followed by the inattention blindness computer task and then by the remaining questionnaires.

RESULTS

Ten participants were excluded from analyses due to computer error (n=2) or reporting the unexpected object but describing it inaccurately (n=8). Of the remaining 495 participants, 229 (46.3%) noticed and accurately described the unexpected cross, a rate of inattentional blindness consistent with other studies using the same task (e.g., Most et al, 2001; Bredemeier & Simons, 2012).

We conducted a correlation analysis between inattentional blindness and individual differences measures (Table 2). We found a trend for greater noticing by participants who performed the touch-counting task more accurately ($p=.084$). Given the number of separate predictors tested in this analysis, coupled with the lack of evidence for such an effect of tracking accuracy in other studies (e.g., Most et al, 2001; Bredemeier & Simons, 2012), that marginal result should be interpreted with caution. Strikingly, not one of our other measures individually predicted noticing, despite an adequately large sample size and a power to detect even a small effect size (i.e., 99% power to detect an odds ratio as small as 0.7).

Although none of the measures individually predicted noticing, perhaps they account for different sources of variance, and collectively can predict noticing. To test that possibility, we included all of the predictors in a single logistic regression to predict noticing. Even with all of the predictors, the model did not account for significant variability in noticing (Nagelkerke $R2 = .036$, $p=.332$). Using all of the predictors only increased the ability to predict noticing from 53.7% with no predictors to 57% with all of the individual differences measures included in the model.

DISCUSSION

The Present findings showed that none of the measures associated with psychopathology (i.e., anxious arousal, worry, and depression), trait affect, and perceived control of cognition and emotion, predicted noticing of an unexpected, non-emotional object. Although the current result is not consistent with initial hypotheses, this result has significant implications, especially given that the study was well powered to detect even a small effect size.

The current results cast two possible interpretations. First, in parallel with the idea that cognitive functions only modulate the processing of task-relevant, expected stimuli while exerting no effect on detecting unexpected objects (Simon & Jensen, 2009), dimensions of psychopathology, personality and affective traits might also only influence the processing of task-relevant stimuli, not task irrelevant, unexpected stimuli. Although emotional distress measures, such as anxiety and depression, and other personality measures (e.g., trait affectivity) are associated with attention control deficits, they do not appear to be directly linked to the likelihood of noticing unexpected, but emotionally neutral objects. Taken together, the current results suggest that there might be distinct processes involved in the ability to process task-relevant, expected stimuli and ignore known distractors and the ability to detect task-irrelevant, unexpected stimuli. Thus, the individual differences associated with *executive attention or attentional control* (e.g., cognitive ability, emotional and personality variables) would not necessarily predict "*stimulus-driven attention capture*" by an unexpected object falling outside of the focus of attention.

As another interpretation, results of the current study indicate that individual differences in psychopathology and trait affect did not influence the processing of a task-irrelevant, unexpected stimulus that had no emotional significance. Combined with previous research that suggested the influence of "attentional set" on processing relevant information (e.g., Lee & Telch, 2008), it is possible that individual differences in emotional trait and state measures would only affect attention to and processing of emotional information by possibly altering the attention control process (e.g., top-down and bottom-up attention), but do not influence the processing of a neutral, unexpected object because the neutral, unexpected objects did not fall under their "emotional attentional set." Thus, this interpretation emphasizes that attentional capture by the unexpected is contingent on the person's prior attentional set (e.g., Folk et al., 1992).

Although both top-down, executive attention control and bottom-up, stimulus-driven attention capture influence how attention is distributed, the mechanisms responsible for each attention system seem to be distinct and thus elicit a differential relationship to different individual difference measures (cognitive ability, emotion, personality). Thus, training people on the primary task and increasing their ability to focus their attention on a given task would not necessarily help advance their ability to detect unexpected objects as long as the attributes of the object fall outside of the attentional set previously determined. In a similar way, people should not be discriminated against for the work that primarily involves attention capture (e.g., finding an unexpected error in the data set) due to cognitive and emotional characteristics relevant to focused, executive attention.

Given the current results, further investigation on this subject matter is warranted. First, although the current study showed that none of the state affect measures predicted noticing of emotionally neutral stimuli, a future study using a more potent indicator for the influence of state emotion, such as mood manipulation, is warranted. Furthermore, given that our sample is exclusively with college students who tend to show a limited range of psychopathology or emotional distress level, future research should be done using a clinical population with diagnosable disorders in order to have a wider range of psychopathology measures. Lastly, given that neither of the cognitive or emotional dimensions themselves predicts noticing, the influence of an interactive effect of cognitive and emotional endogenous features on noticing an unexpected object can be investigated.

TABLES

Table 1. Self-report Questionnaire List

Task Order	Construct	Self-report questionnaire	Reference
1	Trait Negative Affect, Positive Affect, & Fear	Positive and Negative Affect Schedule-Expanded Form (PANAS-X)	Watson & Clark, 1994
2	State Negative Affect, Positive Affect, & Fear	Positive and Negative Affect Schedule-Expanded Form (PANAS-X)	Watson & Clark, 1994
Inattention Blindness Task (Most et al., 2001)			
3	Worry	PSWQ	Meyer et al., 1990
4	Anxious Arousal	MASQ	Watson et al., 1995
5	Anhedonic Depression	MASQ	Watson et al., 1995
6	Attention Control	Attention Control Scale	Derryberry & Reed, 2002
7	Mindfulness	Mindful Attention Awareness Scale	Brown & Ryan, 2003
8	Affective Control	Affective Control Scale	Williams & Chambless, 1997

Table 2. Zero-order correlations between variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.PSWQ	1													
2.MASQAA	.22**	1												
3.MSSQAD	.36**	.26**	1											
4.Trait NA	.39**	.43**	.52**	1										
5.Trait PA	-.25**	-.081	-.67**	-.28**	1									
6.Trait Fear	.37**	.45**	.41**	.83**	-.20**	1								
7.State NA	.30**	.33**	.32**	.57**	-.16**	.49**	1							
8.State PA	-.14**	-.02	-.44**	-.10*	.58**	-.043	.06	1						
9.State Fear	.31**	.37**	.30**	.52**	-.16**	.58**	.83**	.06	1					
10.MAAS	-.09*	-.08	-.15**	-.12**	.13**	-.14**	-.02	.16**	-.03	1				
11.AttentionCtrl	-.33**	-.27**	-.36**	-.40**	.30**	-.35**	-.27**	.21**	-.27**	.33**	1			
12.Affective Ctrl	.49**	.35**	.52**	.48**	-.34**	.44**	.33**	-.16**	.35**	-.09*	-.40**	1		
13.TrackingAccuracy	-.03	-.01	-.01	-.02	.02	-.09	-.02	.03	-.05	-.06	.03	-.03	1	
14. Noticing	-.02	.01	-.03	-.04	.03	-.07	-.03	.01	-.05	-.01	.07	-.01	.08	1

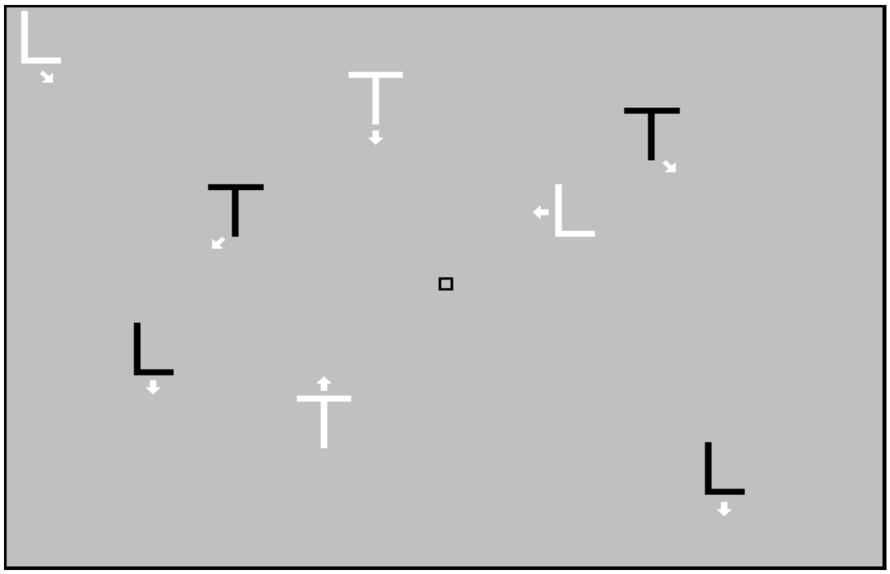
Note: *p<.05; **p<.01.

Table 3. Descriptive Statistics and Logistic Regression Results (predicting whether noticed or not)

	Descriptive Statistics		Logistic Regression Results					
Predictors	Mean SD Range		β (S.E.)		Wald Statistics		P-Value	
	For Noticers	For Non-noticers	Only one variable in the model	All 13 variables included in the model	Only one variable in the model	All 13 variables included in the model	Only one variable in the model	All 13 variables included in the model
PSWQ	51.19 14.80 17-78	51.74 14.27 16-80	-.00 (.01)	.00 (.01)	0.18	0.04	0.67	0.84
MASQAA	27.58 8.75 17-70	27.34 8.64 14-69	.00 (.01)	.01 (.01)	0.10	1.22	0.76	0.27
MSSQAD	55.17 13.81 25-101	55.97 13.92 26-103	-.00 (.01)	-.00 (.01)	0.42	0.03	0.52	0.87
Trait NA	21.92 5.99 10-43	22.45 6.35 10-40	-.01 (.02)	.01 (.03)	0.90	0.12	0.34	0.74
Trait PA	31.86 6.50 13-49	31.53 6.51 14-48	.01 (.01)	.00 (.02)	0.32	0.00	0.57	0.97
Trait Fear	12.27 4.03 6-28	12.82 4.46 6-26	-.03 (.02)	-.04 (.04)	2.09	0.93	0.15	0.33
State NA	15.24 5.14 10-33	15.61 5.95 10-44	-.01 (.02)	.01 (.03)	0.53	0.02	0.47	0.89
State PA	23.45 8.29 10-48	23.27 7.38 10-43	.00 (.01)	.00 (.02)	0.07	0.00	0.80	0.99
State Fear	8.57 3.07 6-21	8.91 3.81 6-27	-.03 (.03)	-.02 (.05)	1.12	0.12	0.29	0.73
MAAS	29.28 5.16 18-61	29.35 6.93 16-73	-.03 (.22)	-.16 (.24)	0.02	0.42	0.90	0.52
Attention Control	50.12 7.82 30-73	48.98 8.16 27-72	.02 (.01)	.02 (.01)	2.47	2.25	0.12	0.13
Affective Control	32.42 7.53 16-57	32.62 7.40 15-57	-.00 (.01)	.01 (.02)	0.09	0.25	0.77	0.62
Tracking Accuracy	.46 .27 0-1	.42 .27 0-1	.59 (.34)	.51 (.35)	2.97	2.16	0.09	0.14

FIGURES

Regular (multiple-object tracking) trials



Critical (inattentional blindness) trial

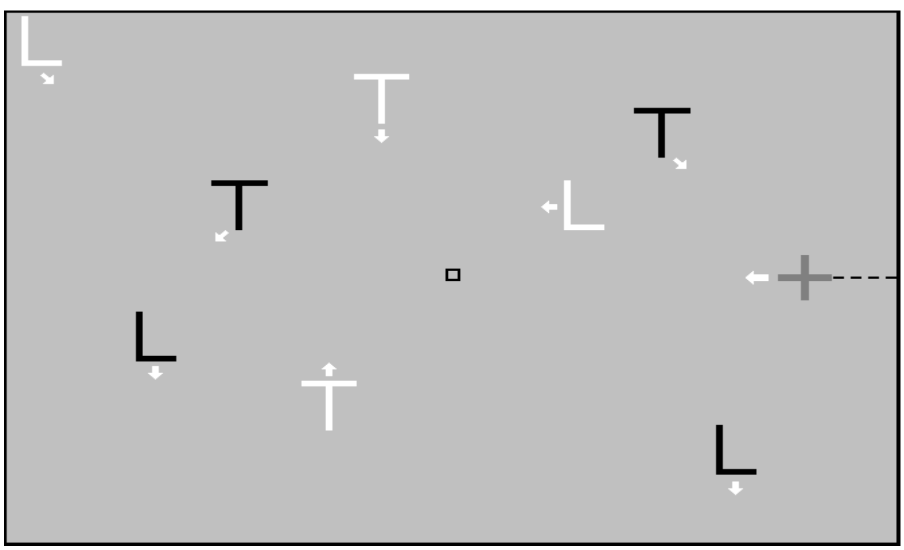


Figure 1: Static illustrations of the inattentional blindness task

REFERENCES

American Psychiatric Association (2000). Diagnostic and statistical manual of mental disorders (4th edition- Text revision). Washington, DC: American Psychiatric Association.

Boot, W. R., Brockmole, J. R., & Simons, D. J. (2005). Attention capture is modulated in dual-task situations. *Psychonomic Bulletin & Review, 12*(4), 662-668.

Bredemeier, K., Berenbaum, H., Brockmole, J.R., Boot, W.R., Simons, D.J., & Most, S.B. (2012). A load on my mind: Evidence that anhedonic depression is like multi-tasking. *Acta Psychologica*, *139*, 137-145.

Bredemeier, K. & Simons, D.J. (2012). Working memory and inattentional blindness. *Psychonomic Bulletin and Review, 19*, 239-244.

Brown, K.W. & Ryan, R.M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*, 822-848.

Cartwright-Finch, U. & Lavie, N. (2007). The role of perceptual load in inattentional blindness. *Cognition*, *102*, 321-340.

Chabris, C.F., Weinberger, A., Fontaine, M., & Simons, D.J. (2011). You do not talk about Fight Club if you do not notice Fight Club: Inattentional blindness for a simulated real-world assault. *i-Perception*, *2*, 150-153.

Crocker, L.D, Heller, W., Spielberg, J.M., Warren, S.L., Bredemeier, K., Sutton, B.P., Banich, M.T., & Miller, G.A. (2012). Neural mechanisms in attentional control differentiate trait and state negative affect. *Frontiers in Psychology*, *3*, 289.

Derakshan, N., & Eysenck, M. W. (2009). Anxiety, processing efficiency, and cognitive performance: New developments from attentional control theory. *European Psychologist*, *14*, 168–176.

Derryberry, D. & Reed, M.A. (2002). Anxiety-related attentional biases and their regulation by attentional control. Journal of Abnormal Psychology, 111, 225-236.

Engels, A.S., Heller, W., Mohanty, A., Herrington, J.D., Banich, M.T., Webb, A.G., & Miller, G.A. (2007). Specificity of regional brain activity in anxiety types during emotion processing. *Psychophysiology, 44,* 352-363.

Eysenck, M.W., Derakshan, N., Santos, R., & Calvo, M.G. (2007). Attention and cognitive performance: attentional control theory. *Emotion, 7,* 336-353.

Engels, A.S., Heller, W., Spielberg, J.M., Warren, S.L., Sutton, B.P., Banich, M.T., & Miller, G.A. (2010). Co-occurring anxiety influences patterns of brain activity in depression. *Cognitive, Affective, and Behavioral Neuroscience, 10*, 141-156.

Folk, C. L., Remington, R., & Johnston, J. C. (1992). Involuntary covert orienting is contingent on attentional control settings. *Journal of Experimental Psychology: Human Perception and Performance, 18*, 1030-1044.

Gotlib, I.H. & Joormann, J. (2010). Cognition and Depression: Current status and future directions. *Annual Review of Clinical Psychology, 6*, 285-312.

Haines, R. F. (1991). A breakdown in simultaneous information processing. In G. Obrecht & L. W. Stark (Eds.), *Presbyopia Research: From Molecular Biology to Visual Adaptation* (pp. 171-175). New York: Plenum.

Heller, W., Etienne, M.A., & Miller, G.A. (1995). Patterns of perceptual asymmetry in depression and anxiety: Implications for neuropsychological models of emotion and psychopathology. *Journal of Abnormal Psychology, 104*, 327–333.

Heller, W., Nitschke, J.B., Etienne, M.A., & Miller, G.A. (1997). Patterns of regional brain activity differentiate types of anxiety. *Journal of Abnormal Psychology, 106*, 376–385.

Hyman, I., Boss, S., Wise, B., McKenzie, K., & Caggiano, J. (2010). Did you see the unicycling clown?: Inattentional blindness while walking and talking on a cell phone. *Applied Cognitive Psychology*, *24*, 597-607.

Lavie, N. & De Fockert, J. (2005). The role of working memory in attention capture. *Psychonomic Bulletin and Review, 12*, 669-674.

Lee, H.J. & Telch, M.J. (2008). Attentional biases in social anxiety: an investigation using the inattentional blindness paradigm. *Behaviour Research and Therapy, 46*, 819-835.

Mack, A. & Rock, I. (1998). *Inattentional blindness*. Cambridge, MA: MIT Press.

Meyer, T.J., Miller, M.L., Metzger, R.L., & Borkovec, T.D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28,* 487-495.

Most, S. B., Simons, D. J., Scholl, B. J., & Chabris, C. F. (2000). Sustained inattentional blindness: The role of location in the detection of unexpected dynamic events. *Psyche, 6*(14).

Most, S.B., Simons, D.J., Scholl, B.J., Jimenez, R., Clifford, E., & Chabris, C.F. (2001). How not to be seen: The contribution of similarity and selective ignoring to sustained inattentional blindness. *Psychological Science, 12*, 9-17.

Most, S.B., Scholl, B.J., Clifford, E.R., & Simons, D.J. (2005). What you see is what you set: Sustained inattentional blindness and the capture of awareness. *Psychological Review*, *112*, 217-242.

Newby, E.A., & Rock, I. (1998). Inattentional blindness as a function of proximity to the focus of attention. *Perception, 27*, 1025-1040.

Nitschke, J.B., Heller, W., Imig, J.C., McDonald, R.P., & Miller, G.A. (2001). Distinguishing dimensions of anxiety and depression. *Cognitive Therapy and Research, 25,* 1-22.

Richards, A., Hannon, E., & Derakshan, N. (2010). Predicting and manipulating the incidence of inattentional blindness. *Psychological Research, 74*, 513-523.

Simons, D.J., & Chabris, C.F. (1999). Gorillas in our midst: Sustained inattentional blindness for dynamic events. *Perception, 28,* 1059–1074.

Simons, D.J. & Jensen, M.S. (2009). The effects of individual differences and task difficulty on inattentional blindness. *Psychonomic Bulletin and Review, 16*, 398-403.

Wallace, J. F., & Newman, J. P. (1997). Neuroticism and the attentional mediation of dysregulatory psychopathology. *Cognitive Therapy and Research, 21*, 135-156.

Watson. D. & Clark. L. A. (1994). *The PANAS-X: Manual for the Positive and Negative Affect Schedule-Expanded Form.* Unpublished manuscript. University of Iowa, Iowa City.

Watson, D., Weber, K., Assenheimer, J.S., Clark, L.A., Strauss, M.E., & McCormick, R.A. (1995). Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology, 104*, 3-14.

Williams, K E., Chambless, D.L., & Ahrens, A. (1997). Are emotions frightening? An extension of the fear of fear construct. *Behaviour Research and Therapy, 35*, 239-248.

FOOTNOTE

Although tracking accuracy on the critical trial significantly predicted noticing ($p=.037$), it is unclear how to interpret this result because the act of noticing the unexpected object could disrupt tracking performance. Therefore, critical tracking accuracy might be a consequence rather than a predictor of noticing. For that reason, we excluded critical trial tracking accuracy from subsequent analyses.